

| Type of risk assessment technique | Description | Relevance of influencing factors | | | Can provide Quantitative output |
|--|--|----------------------------------|----------------------------------|------------|---------------------------------|
| | | Resources and capability | Nature and degree of uncertainty | Complexity | |
| LOOK-UP METHODS | | | | | |
| Check-lists | A simple form of risk identification. A technique which provides a listing of typical uncertainties which need to be considered. Users refer to a previously developed list, codes or standards | Low | Low | Low | No |
| Preliminary hazard analysis | A simple inductive method of analysis whose objective is to identify the hazards and hazardous situations and events that can cause harm for a given activity, facility or system | Low | High | Medium | No |
| SUPPORTING METHODS | | | | | |
| Structured Interview and brainstorming | A means of collecting a broad set of ideas and evaluation, ranking them by a team. Brainstorming may be stimulated by prompts or by one-on-one and one-on-many interview techniques | Low | Low | Low | No |
| Delphi technique | A means of combining expert opinions that may support the source and influence identification, probability and consequence estimation and risk evaluation. It is a collaborative technique for building consensus among experts. Involving independent analysis and voting by experts | Medium | Medium | Medium | No |
| SWIFT Structured "what-if") | A system for prompting a team to identify risks. Normally used within a facilitated workshop. Normally linked to a risk analysis and evaluation technique | Medium | Medium | Any | No |
| Human reliability analysis (HRA) | Human reliability assessment (HRA) deals with the impact of humans on system performance and can be used to evaluate human error influences on the system | Medium | Medium | Medium | Yes |
| SCENARIO ANALYSIS | | | | | |
| Root cause analysis (single loss analysis) | A single loss that has occurred is analysed in order to understand contributory causes and how the system or process can be improved to avoid such future losses. The analysis shall consider what controls were in place at the time the loss occurred and how controls might be improved | Medium | Low | Medium | No |

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| Scenario analysis | Possible future scenarios are identified through imagination or extrapolation from the present and different risks considered assuming each of these scenarios might occur. This can be done formally or informally qualitatively or quantitatively | Medium | High | Medium | No |
| Toxicological risk assessment | Hazards are identified and analysed and possible pathways by which a specified target might be exposed to the hazard are identified. Information on the level of exposure and the nature of harm caused by a given level of exposure are combined to give a measure of the probability that the specified harm will occur | High | High | Medium | Yes |
| Business impact analysis | Provides an analysis of how key disruption risks could affect an organization's operations and identifies and quantifies the capabilities that would be required to manage it | Medium | Medium | Medium | No |
| Fault tree analysis | A technique which starts with the undesired event (top event) and determines all the ways in which it could occur. These are displayed graphically in a logical tree diagram. Once the fault tree has been developed, consideration should be given to ways of reducing or eliminating potential causes / sources | High | High | Medium | Yes |
| Event tree analysis | Using inductive reasoning to translate probabilities of different initiating events into possible outcomes | Medium | Medium | Medium | Yes |
| Cause/ consequence analysis | A combination of fault and event tree analysis that allows inclusion of time delays. Both causes and consequences of an initiating event are considered | High | Medium | High | Yes |
| Cause-and-effect analysis | An effect can have a number of contributory factors which may be grouped into different categories. Contributory factors are identified often through brainstorming and displayed in a tree structure or fishbone diagram | Low | Low | Medium | No |

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| FUNCTION ANALYSIS | | | | | |
| FMEA and FMECA | <p>FMEA (Failure Mode and Effect Analysis) is a technique which identifies failure modes and mechanisms, and their effects.</p> <p>There are several types of FMEA: Design (or product) FMEA which is used for components and products, System FMEA which is used for systems, Process FMEA which is used for manufacturing and assembly processes, Service FMEA and Software FMEA.</p> <p>FMEA may be followed by a criticality analysis which defines the significance of each failure mode, qualitatively, semi-qualitatively, or quantitatively (FMECA). The criticality analysis may be based on the probability that the failure mode will result in system failure, or the level of risk associated with the failure mode, or a risk priority number</p> | Medium | Medium | Medium | Yes |
| Reliability-centred maintenance | A method to identify the policies that should be implemented to manage failures so as to efficiently and effectively achieve the required safety, availability and economy of operation for all types of equipment | Medium | Medium | Medium | Yes |
| Sneak analysis (Sneak circuit analysis) | A methodology for identifying design errors. A sneak condition is a latent hardware, software, or integrated condition that may cause an unwanted event to occur or may inhibit a desired event and is not caused by component failure. These conditions are characterized by their random nature and ability to escape detection during the most rigorous of standardized system tests. Sneak conditions can cause improper operation, loss of system availability, program delays, or even death or injury to personnel | Medium | Medium | Medium | No |
| HAZOP Hazard and operability studies | <p>A general process of risk identification to define possible deviations from the expected or intended performance. It uses a guideword based system.</p> <p>The criticalities of the deviations are assessed</p> | Medium | High | High | No |
| HACCP Hazard analysis and critical control points | A systematic, proactive, and preventive system for assuring product quality, reliability and safety of processes by measuring and monitoring specific characteristics which are required to be within defined limits | Medium | Medium | Medium | No |

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| CONTROLS ASSESSMENT | | | | | |
| LOPA (Layers of protection analysis) | (May also be called barrier analysis). It allows controls and their effectiveness to be evaluated | Medium | Medium | Medium | Yes |
| Bow tie analysis | A simple diagrammatic way of describing and analysing the pathways of a risk from hazards to outcomes and reviewing controls. It can be considered to be a combination of the logic of a fault tree analysing the cause of an event (represented by the knot of a bow tie) and an event tree analysing the consequences | Medium | High | Medium | Yes |
| STATISTICAL METHODS | | | | | |
| Markov analysis | Markov analysis, sometimes called <i>State-space</i> analysis, is commonly used in the analysis of repairable complex systems that can exist in multiple states, including various degraded states | High | Low | High | Yes |
| Monte-Carlo analysis | Monte Carlo simulation is used to establish the aggregate variation in a system resulting from variations in the system, for a number of inputs, where each input has a defined distribution and the inputs are related to the output via defined relationships. The analysis can be used for a specific model where the interactions of the various inputs can be mathematically defined. The inputs can be based upon a variety of distribution types according to the nature of the uncertainty they are intended to represent. For risk assessment, triangular distributions or beta distributions are commonly used | High | Low | High | Yes |
| Bayesian analysis | A statistical procedure which utilizes prior distribution data to assess the probability of the result. Bayesian analysis depends upon the accuracy of the prior distribution to deduce an accurate result. Bayesian belief networks model cause-and-effect in a variety of domains by capturing probabilistic relationships of variable inputs to derive a result | High | Low | High | Yes |